CLAIMS

What is claimed is:

1. An imaging method, comprising:

forming on a surface of an electrically insulating layer supported by an electrically conductive substrate an ink layer having an electrorheological fluid composition comprising a suspension of colorant particles dispersed in an electrically insulating carrier fluid;

projecting a charge image onto the ink layer to selectively form charge-stiffened regions adhering to the electrically insulating layer and representing respective regions of the projected charge image; and

physically separating non-charge-stiffened ink layer components from the charge-stiffened regions.

2. The method of claim 1 wherein said electrically insulating layer is selected from the group consisting of thermoset resins, thermoplastic resins, inorganic glasses, and inorganic oxides.

3. The method of claim 1 wherein said electrically insulating layer has a thickness from about 1 to 500 micrometers.

4. The method of claim 1, wherein the colorant particles and the electrically insulating carrier fluid are characterized by different respective dielectric constants.

5. The method of claim 4, wherein the dielectric constant of the colorant particles is higher than the dielectric constant of the electrically insulating carrier fluid.

6. The method of claim 1, wherein the colorant particles are characterized by a diameter of about 5 μm or less.

7. The method of claim 6, wherein the colorant particles are characterized by a diameter of about 1 μm to about 2 μm.

8. The method of claim 1 wherein said electrically insulating carrier fluid is selected from the group consisting of aliphatic ink oils, mineral oils, mineral spirits, paraffinic fluids, paraffin oils, Magisol 44, and Isopar.

9. The method of claim 1, wherein the ink layer is characterized by a viscosity of about 50 cps to about 5,000 cps.

10. The method of claim 9, wherein the ink layer is characterized by a viscosity of about 100 cps.

11. The method of claim 1, wherein the ink layer is substantially anhydrous.

12. The method of claim 1, wherein the ink layer formed on the electrically insulating layer has a thickness of about 3 μm to about 100 μm.

13. The method of claim 1, wherein projecting the charge image comprises selectively delivering charge species to the ink layer regions to be charge-stiffened.

14. The method of claim 1, wherein the charge-stiffened regions are characterized by a charge exposure density of about 1-100 nanocoulombs/cm^2.

15. The method of claim 1, wherein non-charge-stiffened ink layer components are physically separated from the charge-stiffened regions by applying a shearing force to the ink layer.

16. The method of claim 15, wherein applying a shearing force comprises delivering a flow of a gas across the surface of the ink layer.

17. The method of claim 15, wherein applying a shearing force comprises sweeping a blade across the surface of the ink layer.

18. The method of claim 17, wherein the blade is characterized by a durometer hardness of about 50 Shore A, or less.

19. The method of claim 15, wherein applying a shearing force comprises rolling a cylindrical roller across the surface of the ink layer.

20. The method of claim 15, further comprising generating a region of reduced air pressure in the vicinity of the ink layer.

21. The method of claim 15, further comprising delivering a diluent to the ink layer.

22. The method of claim 21, wherein the diluent is delivered before the shearing force is applied.

23. The method of claim 21, wherein the diluent has the same composition as the electrically insulating carrier fluid.

24. The method of claim 21, wherein the diluent is delivered in the form of a spray.

25. The method of claim 15, wherein the act of applying a shearing force comprises directing a liquid spray toward the ink layer.

26. The method of claim 1, wherein the projected charge image corresponds to a desired final image, and further comprising transferring the charge stiffened ink layer regions to a receptor substrate.

27. The method of claim 1, wherein the projected charge image corresponds to a reverse image of a desired final image, and further comprising transferring non-charge-stiffened ink layer components to a receptor substrate.

28. An imaging system, comprising:

an electrically insulating layer;

an electrically conductive substrate supporting the electrically insulating layer;

an inking system operable to form on a surface of the electrically insulating layer an ink layer having an electrorheological fluid composition comprising a suspension of colorant particles dispersed in an electrically insulating carrier fluid;

a charge imaging print-head operable to project a charge image onto the ink layer to selectively form charge-stiffened regions adhering to the electrically insulating layer and representing respective regions of the projected charge image; and

a developer assembly operable to apply a shearing force to the ink layer to physically separate non-charge-stiffened ink layer components from the charge-stiffened regions.

29. The system of claim 28, wherein the electrically insulating layer is on an electrically conducting substrate.

30. The system of claim 28, wherein the projected charge image corresponds to a desired final image, and further comprising an impression roll assembly operable to transfer the charge stiffened ink layer regions to a receptor substrate.

31. The system of claim 28, wherein the projected charge image corresponds to a reverse image of a desired final image and the developer assembly is operable to transfer non-charge-stiffened ink layer components to a receptor substrate.